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Reply

Ever since the Asymptomatic Carotid Atherosclerosis Study (ACAS) Study[1] reported that an increased perioperative stroke rate following carotid endarterectomy (CEA) in female patients greatly diminished or possibly eliminated the potential benefit of prophylactic CEA, there has been controversy and concern regarding the outcome of cerebrovascular interventions in female patients. In a subsequent large single-institutional study addressing this specific issue, men and women were found to have equal rates of perioperative myocardial infarction (MI), mortality and stroke following CEA.[2] However, the cohort of patients with the highest perioperative stroke rate was symptomatic female patients, with a stroke incidence of 3.0% following CEA.[2] Clearly, symptomatic women may represent a cohort of patients with increased risk.

The majority of the studies on this topic have compared the outcome of female patients to male patients. While these are worthwhile comparisons, one needs to keep in mind that it remains unclear whether the natural history and outcome of patients with severe cerebrovascular disease differs based on sex. It is certainly feasible that women with symptomatic severe carotid artery stenosis may have a worse outcome than corresponding male patients when treated with "best medical" or noninterventional therapies. It is possible, of course, that symptomatic female patients would be at a higher risk of future stroke compared with men if no intervention were performed, and would still benefit from cerebrovascular intervention as opposed to medical management. Hence, the truly important comparison is not female outcome vs male outcome, but rather female outcome *based on the treatment performed*: what is the best treatment for symptomatic female patients with severe carotid artery disease? Should symptomatic female patients be treated with CEA, or with carotid artery angioplasty and stenting (CAS)?

With these issues in mind, Drs. Paraskevas, Mikhailidis, and Veith have authored a provocative letter stating that "CAS is not an acceptable 'alternative' to CEA in this group of patients." Their concern stems from the recent AHA/ASA Guidelines,[3] which do clearly recommend CAS as an "alternative to CEA for symptomatic patients." Dr. Paraskevas and his coauthors cite subsequent literature from the Carotid Revascularization Endarterectomy Versus Stenting (CREST) trial,[4] as well as a recently published review of the Nationwide Inpatient Sample (NIS)[5] to support their conclusion regarding the inferior outcome of CAS in symptomatic women. As seen in the Table below, the CREST trial reports a periprocedural stroke rate in symptomatic women of 7.5% for CAS vs 2.7% with CEA ($P < .03$).[4] The long-term rate of stroke in symptomatic women from the CREST report is 10.4% with CAS, vs 6.9% with CEA ($P = .18$).[4] Finally, the review of the NIS reports a periprocedural stroke rate in symptomatic women of 6.2% with CAS vs 3.4% for CEA ($P = .1$).[5]

In summary, data from both a large randomized prospective trial and an extensive national database clearly suggest a poorer outcome following CAS in symptomatic female patients. Based on the existing literature, as delineated above, I share the authors' concern regarding the appropriateness of CAS in symptomatic female patients. Of course, an individual treatment decision with regard to a particular patient must take into account many specific details, including both anatomic factors and patient comorbidities. However, the existing literature appears to show that CEA may be the preferred treatment in female patients who warrant intervention for symptomatic cerebrovascular disease, unless compelling reasons exist to perform CAS.

Table. Representative periprocedural stroke rates reported in the literature in symptomatic women undergoing carotid endarterectomy and carotid artery angioplasty and stenting

Stroke rate in symptomatic women	*CEA*	*CAS*	P *value*
CREST, perioperative[4]	2.7%	7.5%	0.03
CREST, long-term[4]	6.9%	10.4%	0.2
NIS[5]	3.4%	6.2%	0.1

CREST, Carotid Revascularization Endarterectomy Versus Stenting; *NIS,* Nationwide Inpatient Sample.

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Regarding "Repairing immediate proximal endoleaks during abdominal aortic aneurysm repair"

Rajani et al[1] retrospectively reviewed data of 72 infrarenal abdominal aortic aneurysm (AAA) patients with an intraoperatively diagnosed type Ia endoleak requiring a Palmaz stent or covered stent graft cuff placement. They concluded that both methods appear to be durable long-term options to facilitate endovascular exclusion of AAA, with the results that no recurrent type Ia endoleak developed in the Palmaz stent group and three reinterventions were required in the cuff group. Given the lack of data assessing long-term outcomes of cuff and Palmaz (Cordis, Miami Lakes, Fla) stent placement after immediate type Ia endoleak, we

would like to provide our single-center results and support their conclusions.

Qu et al[2] reported 114 infrarenal AAA patients with short or highly angulated necks who underwent endovascular aortic repair (EVAR) using the Powerlink endograft (Endologix, Irvine, Calif), with proximal aortic extension and with or without use of a Palmaz stent; of these, 83 (72.8%) received a proximal Palmaz stent. Aneurysmal exclusion was successful in 108 patients, with 6 exhibiting minor type Ia endoleak that remained under observation. The 2.6-year follow-up showed four (3.4%) continued type Ia endoleaks, which were revised with a proximal aortic extension or Palmaz stent, or both.

We updated our experience more recently with data through October 2009 involving 189 AAA patients with challenging "off-label" neck anatomy in our center. These patients underwent EVAR with the Powerlink endografts, implanted anatomically from the aortoiliac bifurcation to the renal artery level with a proximal aortic extension and with or without Palmaz stent, and of these, 134 (70.9%) received the proximal Palmaz stent. Nine patients (4.8%) with minor primary type I endoleaks were left under observation. The average 3.2-year follow-up results showed six (3.2%) continuing primary type Ia endoleaks, which were all revised with aortic extension or Palmaz stent, or both. A reduction in mean aneurysm sac diameters and volumes has been noted at every follow-up interval.

In summary, proximal stent graft cuff and Palmaz stent placement appear to be durable long-term options to facilitate EVAR in infrarenal AAA patients with intraoperative type Ia endoleaks or short/angulated necks. Our results also suggested that building up the endovascular exclusion system in the AAA patients with intraoperative proximal type I endoleaks or hostile necks using the Powerlink main device maybe more durable to prevent distal migration and postoperative type Ia endoleak.

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Reply

We appreciate the comments of Drs Raithel, Wu, and Qu. They are to be congratulated on their experience in treating aneurysms with complicated proximal necks, or "off-label" neck anatomy. The rates of type Ia endoleak development in their series appear to be similar to the data we provided in ours, as are the outcomes of treatment. Our study did include the use of a variety of stent grafts, but we were not able to provide adequate statistical evaluation of whether one type of graft performed better in this situation compared with others. Outcomes appeared equivalent regardless of the stent graft used, but the study did not have sufficient power to address this more fully.

It is becoming more apparent that the use of stent grafts to treat aneurysms with anatomy that fall outside of the "indications for use" may not be associated with acceptable long-term outcomes.[1] Although the use of adjuncts, such as aortic cuffs and balloon-expandable stents, allow an endovascular approach to overcome the obstacle of an unfavorable neck, future advancements in endografting technology will provide a better alternative. With the development of fenestrated endografts, in particular, off-the-shelf models, proximal (and distal) landing zones will be easily extended to a healthier segment of aorta in which to obtain a seal. We anticipate this will improve our long-term outcomes and provide a better alternative when the proximal landing zone is less than ideal.

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